Medical–Biological
Research & Technologies

Centrifuge/vortex
Multi - Spin
MSC-6000 / MSC-3000

Operating Manual
Certificate

for versions:
MSC-3000 - V.2AW
MSC-6000 - V.3AY

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1. Safety Precautions

The following symbol means:

Caution! Make sure you have fully read and understood the present Manual before using the equipment. Please pay special attention to sections marked by this symbol.

GENERAL SAFETY

- Use only as specified in the Operating Manual provided.
- The unit should not be used if dropped or damaged.
- The unit must be stored and transported only in a horizontal position (see marking on the package).
- After transportation or storage keep the unit under room temperature for 2-3hrs before connecting it to the electric circuit.
- Use only cleaning and decontamination methods recommended by the manufacturer.
- Use only original accessories (rotors, pins, etc.) provided by the manufacturer and ordered specifically for this model.
- Do not make modifications to the design of the unit.

ELECTRICAL SAFETY

- Connect only to the external power supply unit with voltage corresponding to that on the serial number label.
- Use only the external power supply unit provided with this product.
- Ensure that the external power supply is easily accessible during use.
- Do not plug the unit into an ungrounded power socket, and do not use an ungrounded extension lead.
- Disconnect the unit from the electric circuit before moving.
- Disconnect the external power supply unit from power socket to turn off the unit.
- If liquid penetrates into the unit, disconnect it from the external power supply unit and have it checked by a repair and maintenance technician.
- Do not operate the unit in premises where condensation can form. Operating conditions of the unit are defined in the Specifications section.

DURING OPERATION

- Do not use rotors with visible signs of corrosion, wear or mechanical damage.
- Do not fill in the tubes after they are inserted in the rotor.
- Do not operate the unit in environments with aggressive or explosive chemical mixtures. Please contact manufacturer for possible operation of the unit in specific atmospheres.
- Do not use outside laboratory rooms.
- Do not operate the unit if it is faulty or has been installed incorrectly.

For MSC-3000 model: Do not open the lid, touch the rotor or tubes during work, run-up or run-down of the rotor.

BIOLOGICAL SAFETY

- It is the user's responsibility to carry out appropriate decontamination if hazardous material is spilt on or penetrates into the equipment.

2. General Information

Multi-Spin MSC-6000/MSC-3000 centrifuge/vortex is a next step of evolution of the centrifuge/vortex CombiSpin.

Combi-Spin (the previous name Micro-Spin) was invented and for the first time published by Biol. Dr. V.Bankovskis in 1989 and after the successful approbation and finishing patented in 1994 (V.K.Bankovskis et al., Riga, Latvia, Pat. No. P94-74).

Spin-mix-spin technology is meant for collection or blowdown on microtube bottom of microscopic reagent amounts of (the first centrifugation – spin), the following vortexing (mix) and repeated collection of reagents from microtube walls and caps (repeated spin). This cycle of successive operations aiming at reduction of errors of sample preparation for PCR analysis was called „sms algorithm" (see Table 1).

Table 1. Comparison of FVL-2400N, MSC-3000 and MSC-6000

Specifications	Combispin **FVL-2400N**	Multi-Spin **MSC-3000**	Multi-Spin **MSC-6000**
Speed range maximum	2800 rpm	3500 rpm	6000 rpm
RCF maximum	700g	800g	2350g
Number of tubes	1 individually	12 simultaneously	
Time for completing "Spin-Mix-Spin" cycle			
for 2 microtubes	60 s	25 s	15 s
for 12 microtubes	5-6 min	1 min 30 s	1 min
for 100 microtubes	60 min	15 min	10 min
Unit price ratio	1x	1.6x	1.7x

Implementation of sms algorithm using centrifuge-vortex in manual mode is time-consuming (up to 60 min for 100 samples) and not exempt from subjectivity on centrifugation and vortexing stages. For a long time these factors limited speeding of preparation for PCR reaction.

Multi-Spin MSC-3000 / MSC-6000 is a next step of development of sms technology: it is a fully automated device realizing sms algorithm with good repeatability. Productivity of sms algorithm using Multi-Spin is 6 times higher (up to 100 min per 1000 samples) than that for centrifuge-vortex Combi-Spin.

Multi-Spin is four devices combined in one:

1. Centrifuge (Maximum RCF: MSC-3000: up to 800 × g or MSC-6000: up to 2350 × g);
2. Vortex (3 vortexing modes - soft, medium, hard; regulated time; vortexing regulation timer 1–20 s);
3. Centrifuge/vortex;
4. SMS-cycler for realisation of the “SMS-algorithm”.

Areas of application:

- Reproducible multi-tube vortexing;
- Centrifugation of samples;
- Reproducible Spin->Mix->Spin cycling;
- PCR samples premixing before thermo cycling;
- Micro sampling before enzymatic reaction;
- Cells permeabilization by chelating or hydrophobic agents for reaction ***in situ;***
- Low solubility drug testing;
- Cells washing from culture media after fermentation;
- Preparing a sample for electrophoresis;
- Magnetic beads technology.

Automatic stop of MSC-3000 when the lid is open and the lid lock in MSC-6000 provides safe operation. The external power supply unit ensures the electrical safety of the Multi-Spin.

3. Getting started

3.1. Unpacking.

Remove packing materials carefully and retain for future shipment or storage of the unit.

Examine the unit carefully for any damage incurred during transit. The warranty does not cover in-transit damage.

3.2. Complete set. Package contents:

Standard set:

- Multi-Spin MSC-3000/MSC-6000 centrifuge/vortex . . . . . 1 pce
- external power supply unit . . . . . 1 pce
- power cord for MSC-6000 . . . . . 1 pce
- rotor fixation pin . . . . . 1 pce
- R-0.5/0.2 rotor ❶ . . . . . 1 pce
- R-1.5 rotor ❷ . . . . . 1 pce
- Operating Manual; Certificate . . . . . 1 copy

Optional accessories:

- R-2/0.5 rotor ❸ . . . . . on request
- R-2/0.5/0.2 rotor ❹ . . . . . on request
- SR-16 rotor ❺ . . . . . on request

3.3. Set up:

– place the unit on the clean, even, horizontal, working area;

Caution! Regularly clean MSC-3000 support suction feet for improvement of their adhesion with desk surface.

– remove protective film from the display;

– plug the external power supply unit into the 12 V socket at the rear side of the unit;

– remove protective film from the display;

– according to EN 61010-2-20 people and hazardous materials must not be within a 300 mm area around the device during the centrifuge operation.

3.4. Rotor replacement:

To change a rotor (Fig.1/2): insert the provided pin into the opening in the fixation head (Fig.1/1). Hold the rotor with one hand and turn the fixation head (using the pin as a lever) counter clockwise to set rotor free. Change the rotor and fix it properly putting back the fixation head.

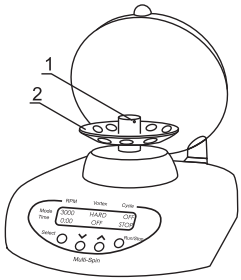
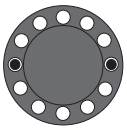


Fig.1 Rotor replacement

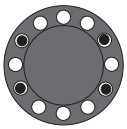
4. Operation

Recommendation during operation

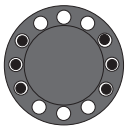
Check the rotor for any signs of wear and replace if necessary. Insert EVEN number of tubes in rotor one opposite another. The opposite tubes must be filled equally.



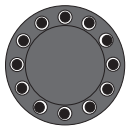
2 TUBE ARRANGEMENT



4 TUBE ARRANGEMENT



6 TUBE ARRANGEMENT



FULL ARRANGEMENT

4.1. Connect the external power supply unit to the grounded power socket.

4.2. Open the lid and place EVEN number of tubes in rotor sockets one opposite another. Close the lid.

4.3. Parameter setting: Press the **Select** key (Fig.2/3) to choose the parameter to change (each press of the **Select** key will sequentially activate the parameters in the cycle, the active parameter is blinking).

4.4. Use "▲" and "▼" keys (Fig.2/6) to set the necessary value (note: pressing the key down for more than 2 sec will make the values change quickly).

4.5. The program can also be changed during operation: microprocessor automatically enters the last changes into the memory as the working program when the new cycle begins.

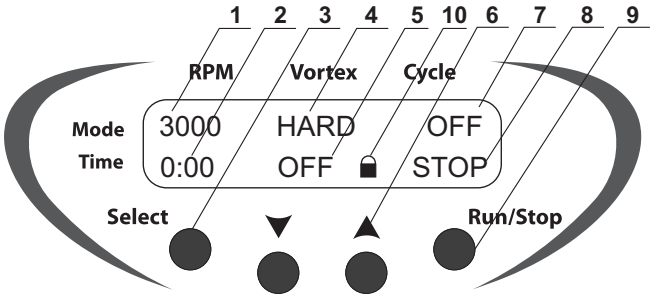


Fig.2 Control panel

4.6. SMS - algorithm

4.6.1. Set the required spinning speed (increment 100 rpm, Fig.2/1).

4.6.2. Set centrifugation time (time less than 1 min - with 1 s increment, more than 1 min - with 1 min increment, Fig.2/2).

4.6.3. Set the vortexing intensity (select from soft, medium and hard, Fig.2/4).

4.6.4. Set the time of vortexing, from 1 to 20 s (increment 1 sec, Fig.2/5).

4.6.5. Set the number of the set sms-algorithm repetitions (from 1 till 999 times, Fig.2/7).

4.7. Centrifugation

4.7.1. Set the necessary speed of spin (increment 100 RPM, Fig.2/1).

4.7.2. Set the centrifugation time (time less than 1 min - with 1 s incrment, more than 1 min - with 1 min increment, Fig.2/2).

4.7.3. Turn off the Vortex type motion by setting the time of Vortex type motion to zero (OFF, Fig. 2/5). Note that the cycle counter turns off.

4.8. Vortexing

4.8.1. Turn off the Spin motion by setting the time of Spin motion to zero (OFF, Fig. 2/2). Note that the cycle counter turns off.

4.8.3. Set the vortexing intensity (select from soft, medium and hard, Fig.2/4).

4.8.4. Set the time of vortexing (from 1 till 20 sec, increment 1 sec, Fig.2/5).

4.9. Press the **Run/Stop** key (Fig.2/9) to start the program.

4.10. The rotor motion will begin and the corresponding indication (RUN (Fig.2/8), cycle countdown (Fig.2/7), the changing time values (Fig.2/2 or Fig.2/5)) and for MSC-6000 lid lock symbol 🔒 (fig.2/10) will be shown on the display.

4.11. Multi-Spin automatically stops after the set number of cycles is performed (blinking indication STOP (fig.2/8) on the display) and gives a sound signal about the end of operation (press the **Run\Stop** key to stop the signal).

4.12. For the repeated operation according to the set program press the **Run\Stop** key.

4.13. If necessary Multi-Spin can be stopped at any time during operation before the set number of cycles is performed by pressing the **Run/Stop** key. Pressing the **Run/Stop** key again will start the program from the beginning (cycle countdown will be restarted).

4.14. After finishing the operation unplug the external power supply unit form electric circuit to turn off the device.

Note! The MSC-6000 electromechanical lid lock allows opening the lid only when the centrifuge is connected to the power supply and is turned on. Do not force the lid to open when the centrifuge is switched off!

4.15. MSC-6000 lid emergency opening

4.15.1. Disconnect the external power supply unit from electric circuit and wait until the centrifuge rotor stops.

4.15.2. Move the centrifuge to the front of the bench to access the emergency opening slot on the underside of the unit (located under the front side left feet). Avoid tilting the centrifuge as this may cause spilling of the materials from the containers inside the centrifuge.

4.15.3. Insert a small screwdriver, or a similar tool (with diameter up to 3 mm) into the emergency opening slot at 15 mm depth and move the lever from the left to the right side with one hand and simultaneously with another hand open the lid.

5. Specifications

The unit is designed for operation in cold rooms, incubators and closed laboratory rooms at ambient temperature from +4°C to +40°C in a non-condensing atmosphere and maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.

Model	MSC-3000	MSC-6000
Speed control range (increment 100 rpm)	1000 - 3500 rpm	1000 - 6000 rpm
Maximum RCF	800g	2350g
Spin timer	1 s - 99 min	1 s - 30 min
Vortexing intensity	Soft, medium, hard	
Vortexing time	0 - 20 s (increment 1s)	
SMS-cycle regulation	1 - 999 cycles	
Safety	Autostop at open lid	Lid lock
Weight*	2.1 kg	2.5 kg
Input current / power consumption	DC 12V / 11 W (0.9 A)	DC 24V / 24 W (1 A)
External power supply	input AC 100-240 V 50/60Hz	
	output DC 12V	output DC 24V

* Accurate within ±10%.

Optional accessories	Description	Catalogue number
R-2/0.5 rotor	for 8x2.0 ml and 8x0.5 ml microtest tubes	BS-010205-CK
R-2/0.5/0.2 rotor	for 6x2.0 ml, 6x0.5 ml and 6x0.2 ml microtest tubes	BS-010205-DK
SR-16 rotor	for 2 strips for 8x0.2 ml microtest tubes	BS-010202-AK

Replacement parts	Description	Catalogue number
R-1.5 rotor	for 12x1.5 ml microtest tubes	BS-010205-AK
R-0.5/0.2 rotor	for 12x1.5 ml and 12x0.2 ml microtest tubes	BS-010205-BK

Biosan is committed to a continuous programme of improvement and reserves the right to alter design and specifications of the equipment without additional notice.

6. Maintenance

6.1. If the unit requires maintenance, disconnect the unit from the electric circuit and contact Biosan or your local Biosan representative.

6.2. All maintenance and repair operations must be performed only by qualified and specially trained personnel.

6.3. Standard ethanol (75%) or other cleaning agents recommended for cleaning of laboratory equipment can be used for cleaning and disinfection of the unit.

Regularly clean MSC-3000 support suction feet for improvement of their adhesion with desk surface.

To clean the support suction feet and desk surface, use mild soap and water with a soft cloth or sponge. Wipe excess water from support suction feet and desk surface with an absorbent soft cloth or sponge.

7. Warranty and Claims

7.1. The Manufacturer guarantees the compliance of the unit with the requirements of Specifications, provided the Customer follows the operation, storage and transportation instructions.

7.2. The warranted service life of the unit from the date of its delivery to the Customer is 24 months. Contact your local distributor to check availability of extended warranty.

7.3. If any manufacturing defects are discovered by the Customer, an unsatisfactory equipment claim shall be compiled, certified and sent to the local distributor address. Please visit www.biosan.lv, Technical support section to obtain the claim form.

7.4. The following information will be required in the event that warranty or post-warranty service comes necessary. Complete the table below and retain for your records.

Model	Multi-Spin MSC-3000 / MSC-6000 Centrifuge / Vortex
Serial number	
Date of sale	

8. Declaration of Conformity

Declaration of Conformity

Equipment name:	**MSC-6000 / MSC-3000 Multi-Spin**
Type of equipment:	Centrifuge/vortex
Directive:	EMC Directive 2004/108/EC Low Voltage Directive 2006/95/EC RoHS 2011/65/EC WEEE 2002/96/EC & 2012/19/EU
Manufacturer:	SIA BIOSAN Ratsupites 7, build.2, Riga, LV-1067, Latvia
Applied Standards:	**EN 61326-1:** Electrical equipment for measurement, control and laboratory use EMC requirements. General requirements **EN 61010-1:** Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements **EN 61010-2-20:** Particular requirements for laboratory centrifuges

We declare that this product conforms to the requirements of the above Directive(s)

Signature
Svetlana Bankovska
Managing director
12.06.2013
Date

Signature
Aleksandr Shevchik
Engineer of R&D
12.06.2013
Date

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